Listing of Claims

1-4 Canceled

5. (Previously Presented) A multi-channel PWM (Pulse Width Modulator) apparatus, comprising:

a plurality of pulse width modulation means for modulating audio signals into PWM-based multi-channel audio signals; and

gain control means connected to the plurality of pulse width modulation means for receiving the audio signals received at the plurality of pulse width modulation means, wherein the gain control means independently controls gains of the received audio signals according to individual channels.

6. (Previously Presented) The apparatus as set forth in claim 5, wherein the gain control means comprises:

a plurality of gain controllers that each vary levels of one respective corresponding audio signal of the multi-channel audio signals received at the pulse width modulation means;

a plurality of comparators each coupled to an output of a single corresponding gain controller that compare levels of audio signals generated from the gain controllers with a reference level;

AGC (Automatic Gain Control) means configured to receive all output signals of the comparators for variably controlling the gain controllers according to individual output signals of the comparators; and

a plurality of adders that perform addition or subtraction between a control signal generated from the AGC means and volume control signals for each channel, and independently varying gains for said each channel,

wherein each of the adders receives two input signals being a corresponding volume control signal for one channel and the control signal from the said AGC means and outputs an independent gain control signal to said single corresponding gain controller for said corresponding audio signal for said one channel.

7. (Currently Amended) The apparatus as set forth in claim 5 [[6]], wherein the number of the gain controllers, the comparators, or the adders is identical with a number of channels of the pulse width modulation means.

8. (Original) The apparatus as set forth in claim 7, wherein the plurality of pulse width modulation means receive a reference signal, and wherein the gain control means controls gains when the reference signal indicates an overload condition of the pulse width modulation.

9. (Canceled)

10. (Previously Presented) The apparatus as set forth in claim 8, wherein the pulse width modulation means is comprised of six pulse width modulators for PWM-modulating PCM-based six-channel audio signals read from an optical disc while being classified according to individual channels.

11. (Previously Presented) The apparatus as set forth in claim 8, comprising:

control means for independently turning on/off the plurality of pulse width modulation means according to individual channels, wherein the control means includes six AND gates for selectively enabling six pulse width modulators or a subset of pulse width modulators from among the six pulse width modulators.

12. (Original) The apparatus as set forth in claim 11, wherein the AND gates each receive an overload condition signal for compulsorily tuning off the pulse width modulators when a value of system load is higher than a reference value, and PWM on/off control signals for every channel for turning on/off the pulse width modulators according to a user's key signal or an optical disc type, and performing an AND operation between the overload condition signal and the PWM on/off control signals.

13. (Previously Presented) An audio/visual receiver, comprising:

a reader configured to output a first data signal based on information stored in a recording medium;

a tuner configured to output a second data signal;

a decoder coupled to the reader configured to decode the data signals into audio signals;

a pulse width modulator device configured to modulate the audio signals into PWM-based multi-channel audio signals that comprises,

a plurality of pulse width modulators configured to modulate the audio signals into the PWM-based multi-channel audio signals; and

a plurality of signal controllers coupled to the plurality of modulators to independently control at least one of input signals and output signals of the plurality of pulse width modulators, wherein the plurality of signal controllers comprise a plurality of gain controllers that each receive one of the audio signals received for a corresponding one of the plurality of pulse width modulators, wherein the gain controllers independently control gains of the received audio signals according to individual channels; and

at least one speaker configured to receive and output the PWM-based multi-channel audio signals.

14. (Original) The receiver of claim 13, wherein the plurality of signal controllers comprise a plurality of phase shifters that phase-shift modulated output signals received from the pulse width modulators.

15. (Canceled)

16. (Previously Presented) The receiver of claim 14, wherein the plurality of signal controllers comprise a plurality of controllers that independently enable the plurality of pulse width modulators according to individual channels.

17. (Canceled)

18. (Original) The apparatus of claim 13, wherein the plurality of signal controllers comprise a plurality of controllers that independently turn on/off the plurality of pulse width modulators according to individual channels.

19. (Previously Presented) A multi-channel PWM (Pulse Width Modulator) apparatus, comprising:

a plurality of pulse width modulators configured to modulate audio signals into PWM-based multi-channel audio signals; and

a plurality of signal controlling means coupled to the plurality of modulators for controlling at least one of input signals and output signals of the plurality of pulse width modulators, wherein the plurality of signal controlling means comprise a plurality of phase shifting means for phase-shifting modulated output signals received from the pulse width modulators,

wherein the plurality of signal controlling means comprise a plurality of gain control means for receiving the audio signals received at the plurality of pulse width modulators, wherein the gain control means independently controls gains of the received audio signals according to individual channels of the pulse width modulators, and

wherein the plurality of signal controlling means comprise a plurality of control means for independently turning on/off the plurality of pulse width modulators according to said individual channels, while audio signals are being received at said PWM apparatus.

20-26 (Canceled)

27. (Currently Amended) An audio/visual receiver, comprising:

a reader configured to output a first data signal based on information stored in a recording medium;

a tuner configured to output a second data signal;

a decoder coupled to the reader configured to decode the data signals into audio signals;

a pulse width modulator device configured to modulate the audio signals into PWM-based multi-channel audio signals that comprises,

a plurality of pulse width modulators configured to modulate the audio signals into the PWM-based multi-channel audio signals; and

a plurality of signal controllers coupled to the plurality of modulators to independently control at least one of input signals and output signals of the plurality of pulse width modulators, wherein the plurality of signal controllers comprise a plurality of controllers that independently enable the plurality of pulse width modulators according to individual channels.

28. (Previously Presented) The apparatus as set forth in claim 27, wherein the pulse width modulators comprise six pulse width modulators for PWM-modulating PCM-based six-channel audio signals read from the recording medium while being classified according to individual channels, wherein the controllers include six AND gates for selectively enabling all the six pulse width modulators or a subset of pulse width modulators from among the six pulse width modulators, and

wherein the AND gates each receive an overload condition signal for compulsorily tuning off the pulse width modulators when a value of system load is higher than a reference value, and PWM on/off control signals for every channel for turning on/off the pulse width modulators according to a user's key signal or an optical disc type, and performing an AND operation between the overload condition signal and the PWM on/off control signals.

29. (Previously Presented) The receiver of claim 27, wherein the plurality of signal controllers comprise a plurality of gain controllers that receive one of the audio signals received at a corresponding one of the plurality of pulse width modulators, wherein the gain controllers independently control gains of the received audio signals according to individual channels.

30. (Previously Presented) The apparatus as set forth in claim 29, wherein the gain control means comprises:

a plurality of comparators each coupled to an output of a single corresponding gain controller that compare levels of audio signals generated from the gain controllers with a reference level;

AGC (Automatic Gain Control) means configured to receive all output signals of the comparators for variably controlling the gain controllers according to individual output signals of the comparators; and

a plurality of adders that perform addition or subtraction between a control signal generated from the AGC means and volume control signals for each channel, and independently varying gains for said each channel

wherein each of the adders receives two input signals being a corresponding volume control signal for one channel and the control signal from the said AGC means and outputs an independent gain control signal to said single corresponding gain controller for said corresponding audio signal for said one channel.